

-11-

**WHAT IS CLAIMED IS:**

1. A method for the operation of an internal combustion engine comprising the steps of:
  - providing oxygen-enriched air and fuel to a
  - 5 combustion chamber;
  - initiating combustion of the oxygen-enriched air
  - and fuel; and
  - providing a predefined volume of nitrogen-enriched
  - air to the combustion chamber after a predefined time
  - 10 delay to be used during the remainder of the
  - combustion.
2. The method of claim 1, wherein prior to the
  - step
  - 15 of providing oxygen-enriched air and fuel to a
  - combustion chamber:
    - providing an input air stream to a membrane; and
    - separating, using the membrane, an input air
    - stream to produce the oxygen-enriched air and the
    - 20 nitrogen-enriched air.
3. The method of claim 1, wherein the predefined
  - time delay comprises:
  - substantially four milliseconds.
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4. The method of claim 1, wherein the predefined
  - volume of nitrogen-enriched air comprises:

-12-

substantially ninety-percent of the volumetric mass within the combustion chamber.

5        5.    The method of claim 1, wherein the internal combustion engine comprises:

        a diesel engine.

        6.    The method of claim 1, wherein the internal combustion engine comprises:

10        a gasoline engine.

        7.    An apparatus comprising:

        a separation device for receiving an input air stream and producing oxygen-enriched air and nitrogen-enriched air;

        a holding chamber for receiving the nitrogen-enriched air from said separation device; and

        a combustion chamber for receiving the oxygen-enriched air from said separation device and a combustible fuel, the combustion chamber initiating a combustion process using the oxygen-enriched air and the combustible fuel, and further receiving a predefined volume of the nitrogen-enriched air from the holding chamber after a predefined time delay to be used during the remainder of the combustion process.

        8.    The apparatus of claim 7, wherein said separation device comprises:

-13-

a membrane.

9. The apparatus of claim 7, wherein the  
predefined

5 time delay comprises:

substantially four milliseconds.

10. The apparatus of claim 7, wherein the  
predefined

10 volume of nitrogen-enriched air comprises:

substantially ninety-percent of the volumetric  
mass within the combustion chamber.

11. The apparatus of claim 7, wherein the holding  
15 chamber further comprises:

at least one of an injection nozzle, an electronic  
valve, a mechanical valve, and a pump for providing the  
desired predefined volume of the nitrogen-enriched air  
to the combustion chamber.

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12. The apparatus of claim 7, wherein the  
internal combustion engine comprises:

a diesel engine.

25 13. The apparatus of claim 7, wherein the  
internal combustion engine comprises:

a gasoline engine.

-14-

14. An internal combustion engine comprising:  
a separation device for receiving an input air stream and producing oxygen-enriched air and nitrogen-enriched air;

5 a holding chamber for receiving the nitrogen-enriched air from said separation device; and  
a combustion chamber for receiving the oxygen-enriched air from said separation device and a combustible fuel, the combustion chamber initiating a  
10 combustion process using the oxygen-enriched air and the combustible fuel, and further receiving a predefined volume of the nitrogen-enriched air from the holding chamber after a predefined time delay to be used during the remainder of the combustion process.

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15. The internal combustion engine of claim 14, wherein said separation device comprises:  
a membrane.

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16. The internal combustion engine of claim 14, wherein the predefined time delay comprises:  
substantially four milliseconds.

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17. The internal combustion engine of claim 14, wherein the predefined volume of nitrogen-enriched air comprises:

substantially ninety-percent of the volumetric mass within the combustion chamber.

-15-

18. The internal combustion engine of claim 14,  
wherein the holding chamber further comprises:

at least one of an injection nozzle, an electronic  
valve, a mechanical valve, and a pump for providing the  
5 desired predefined volume of the nitrogen-enriched air  
to the combustion chamber.

19. The internal combustion engine of claim 14,  
wherein the internal combustion engine comprises:

10 a diesel engine.

20. The internal combustion engine of claim 14,  
wherein the internal combustion engine comprises:

a gasoline engine.

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